

# EXHIBIT A

**Lee E. Kirsch**

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**EDUCATION AND PROFESSIONAL HISTORY**

**Education**

Ph D, Pharmaceutics, 1982  
The Ohio State University

BS, Pharmacy, 1975  
Purdue University

**Professional and Academic Positions**

Professor, The University of Iowa, August 2010 - Present, Division of Pharmaceutics (Primary Appointment), Department of Chemical and Biochemical Engineering (Secondary Appointment), and International Programs (Secondary Appointment: June 2014 – Present).

Visiting Professor, Mahidol University, Faculty of Pharmacy, Thailand (January, 2014 – April, 2014)

Professor, Virginia Commonwealth University, Department of Pharmaceutics (Affiliate Appointment). (May 2005 - Present).

Adjunct Professor, Pharmaceutical Technology, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Thailand (2003 – present)

Associate Professor, The University of Iowa, College of Pharmacy. (November 1994 - July 2010).

Associate Professor, The University of Iowa, Department of Chemical and Biochemical Engineering (Secondary Appointment). (May 2006 - July 2010).

Senior Research Scientist/group leader, Lilly Research Laboratories. (January 1992 - November 1994).

Research Scientist/group leader, Lilly Research Laboratories. (January 1987 - January 1992).

Senior Pharmaceutical Chemist, Lilly Research Laboratories. (November 1982 - January 1987).

Research Associate, The Ohio State University. (June 1979 - November 1982).

Teaching Assistant, The Ohio State University. (August 1978 - June 1979).

Community Pharmacist, Family Pharmacy North Bloomington, Indiana. (July 1975 - August 1978).

## **Honors and Recognition**

Editor-in-chief, AAPS PharmSciTech Journal. (July 2008 – December, 2014).  
Fellow of the American Association of Pharmaceutical Scientists (June 2013)  
Distinguished Service Award, Parenteral Drug Association. (February 2011).  
Editor, PDA Journal of Pharmaceutical Science and Technology. (July 2000 - June 2008).  
Fred Simon Award for best paper, PDA Journal of Pharmaceutical Science and Technology.  
(October 1997).  
Jack L. Beal Postbaccalaureate Award, The Ohio State University College of Pharmacy. (May 1997).

## **TEACHING AT THE UNIVERSITY OF IOWA AND EXTERNAL TEACHING: INTERNATIONAL AND US**

### Professional PharmD Courses

Pharmacokinetics and Biopharmaceutics, Pharmacy 46:138, 2002-2009  
Pharmaceutical Proteins unit in Pharmacy 46:123, 2002-2013  
Advanced Compounding, Pharmacy 46:120, 2004-2005  
Drug Stability in Pharmacy 46:123 and 46:124, 2005-2013, 1995-2000  
Fundamentals of Kinetics in Pharmacy 46:123, 46:050, 2005-2013  
Fundamentals of Pharmacokinetics in Pharmacy 46:124, 2010-2013  
Solids processing, Packaging, Capsules, Lyophilized Powders units in Pharmacy 46:124, 1995-2000

### Graduate Courses in Pharmaceutics

Pharmacy Research, Pharmacy 46:233, 1995-2015  
Pharmaceutical Product Development, Pharmacy 46: 225, 1999 and 2006  
Drug Degradation Kinetics and Mechanisms (Drug Stability) 46:206, 1995, 1997, 1999, 2001, 2003, 2007, 2009, 2011, 2013

### External Teaching: International and US

Pharmaceutical Package Integrity, PDA Research and Training Center, 1998  
Drug Degradation Kinetics Short Course, Chulalongkorn University, International Pharmaceutical Technology Graduate Program, 2002, 2003, 2005, 2008, 2009, 2010, 2011, 2012, 2013, 2014 Bangkok, Thailand  
Drug Degradation Kinetics Short Course, Virginia Commonwealth University, Pharmaceutical Sciences Graduate Program, 2005  
Drug Degradation Kinetics Short Course, Mahidol University, Bangkok, Pharmaceutical Sciences Graduate Program, 2014  
Chaired working group (The University of Iowa) Education to evaluate the concept of an intercollegiate undergraduate degree in pharmaceutical engineering and science  
Chaired the education committee for NIPTE working on the design of a national curriculum in pharmaceutical technology

### M.S. Students Directed

Craig Moeckly (Non-thesis) degree conferred 1997  
Walaisiri Muangsiri (Thesis) degree conferred July, 2000

Simei Li (Non-thesis) degree conferred December, 2000  
Bhanu Kalvakota (Non-thesis) degree conferred December, 2002  
Pipat Sittisak (Thesis) with W. Muangsiri, Chulalongkorn University, degree conferred 2010

Ph.D. Students Directed

Young-Sihn Sihn, degree conferred June 1997  
Lida Nguyen, degree conferred December, 2001  
Xiaoguang Zhang, degree conferred December, 2001  
Anjali Joshi, degree conferred December, 2001  
Walasiri Muangsiri, degree conferred December, 2003  
Madhushree Gokhale, degree conferred May, 2006  
Himanshu Naik (with L. Fleckenstein), degree conferred December, 2007  
Boontarika Chanvorachote (with W. Muangsiri), degree conferred June, 2009 (Chulalongkorn University)  
Salil Desai degree conferred December, 2009  
Zhixin Zong degree conferred May, 2012  
Jiang Qiu, degree conferred May, 2013  
Hong Guann Lee (with D. Flanagan), degree conferred May, 2015  
Nguyen Quynh Hoa, degree conferred December, 2014  
Radaduen Tinmanee, thesis defended May, 2015, anticipated graduation December, 2015  
Mo'tasem Mohamed Alsmadi (with L. Fleckenstein), degree conferred December, 2014  
Phawanan Sawangchan, pre-comprehensive  
Pratak Ngeacharernkul pre-comprehensive  
Éverton do Nascimento Alencar, visiting Ph.D. scholar from Federal University of Rio Grande do Norte, Natal, Brazil, 2014-2015

Post-doctoral Scholars

Gisela N. Piccirilli, Ph.D., 2011  
Stephen Stamatias, Ph.D., 2011-2013  
Eiji Ueyama, Ph.D., 2013-2014

**SCHOLARSHIP/RESEARCH/PROFESSIONAL PRODUCTIVITY**

**Publications**

1. Salil Dileep Desai and Lee E. Kirsch The Ortho Effect on the Acidic and Alkaline Hydrolysis of Substituted Formanilides, accepted for publication in *International Journal of Chemical Kinetics*, April, 2015.
2. Hoa Q. Nguyen, Stephen D. Stamatias, Lee E. Kirsch, A novel method for assessing drug degradation product safety using physiologically-based pharmacokinetic models and stochastic risk assessment, accepted for publication *Journal of Pharmaceutical Science*, 2015
3. Boontarika Chanvorachote, Jiang Qiu, Walasiri Muangsiri, Ubonthip Nimmannit, and Lee E. Kirsch (2015) The interaction mechanism between lipopeptide (daptomycin) and polyamidoamine (PAMAM) dendrimers, *Journal of Peptide Science*, DOI: 10.1002/psc.2752.
4. Qiu, J. and Kirsch, Lee E. (2014) Evaluation of Lipopeptide (Daptomycin) Aggregation Using Fluorescence, Light Scattering, and Nuclear Magnetic Resonance Spectroscopy,

- Journal of Pharmaceutical Sciences*, 103(3), 853–861.
5. Dempah KE, Barich DH, Kaushal AM, Zong Z, Desai SD, Suryanarayanan R.; Kirsch L, Munson EJ; (2013) Investigation Gabapentin Polymorphism Using Solid-State NMR Spectroscopy; *AAPS PharmSciTech*, 14(1), 19-28.
  6. Zong, Z., Qiu, J., Tinamnee, R., Kirsch, L. E. (2012). Kinetic model for solid-state degradation of gabapentin. *Journal of Pharmaceutical Science*, 101(6), 2123-2133.
  7. Zong, Z., Kirsch, L. E. (2012). Studies on the Instability of Chlorhexidine, Part 1. *Journal of Pharmaceutical Science*, 101(7), 2417-2427.
  8. Mockus, L., Lainez, J., Reklaitis, G., Kirsch, L. E. (2011). A Bayesian Approach to Pharmaceutical Product Quality Risk Quantification. *Informatica*, 22(4), 537-558.
  9. Qiu, J., Yu, L., Kirsch, L. E. (2011). Estimated pKa values for specific amino acid residues in daptomycin. *Journal of Pharmaceutical Science*, 100(10), 4225-4233.
  10. Ratcliff, J. L., Kirsch, L. E., Dykstra, J. W., Cooley, W. E. (2011). Fluoride and chlorine dioxide-containing compositions and method for reducing demineralization of teeth. *PCT Int. Appl*, WO 2010075419 A1 20100701.
  11. Zong, Z., Desai, S., Barich, A., Huang, H.-S., Munson, E., Suryanarayanan, R., Kirsch, L. E. (2011). The Stabilizing Effect of Moisture on the Solid-State Degradation of Gabapentin. *AAPS PharmSciTech*, 12(3), 924-931.
  12. Chanvorachote, B., Nimmannit, U., Muangsiri, W., Kirsch, L. E. (2009). An Evaluation of a Fluorometric Method for Determining Binding Parameters of Drug–Carrier Complexes Using Mathematical Models Based on Total Drug Concentration. *Journal of Fluorescence*, 19(4), 747-753.
  13. Gokhale, M., Kearney, W., Kirsch, L. E. (2009). Glycosylation of Aromatic Amines I: Characterization of the Reaction Products of Kynurenine and Glucose in Aqueous Solutions. *AAPS PharmSciTech*, 10(2), 317-328.
  14. Tan, B., Naik, H., Jang, I.-J., Yu, K.-S., Kirsch, L. E., Shin, C.-S., Fleckenstein, L. (2009). Population Pharmacokinetics of Artesunate and Dihydroartemisinin Following Single- and Multiple-Dosing of Oral Artesunate in Healthy Subjects. *Malaria Journal*, 8(1), 304.
  15. Gokhale, M., Kirsch, L. E. (2009). Glycosylation of aromatic amines II: Kinetics and mechanisms of the hydrolytic reaction between kynurenine and glucose. *Journal of Pharmaceutical Science*, DOI 10.1002/jps.21754.
  16. Gokhale, M., Kirsch, L. E. (2009). Glycosylation of aromatic amines III: Mechanistic implications of the pH-dependent glycosylation of various aromatic amines (kynurenine, 2'-aminoacetophenone, daptomycin, and sulfamethoxazole). *Journal of Pharmaceutical Science*, DOI 10.1002/jps.21765.
  17. Kirsch, L. E. (2008). On Transforming Pharmaceutical Technology Education. <http://www.pharmamanufacturing.com/articles/2008/113.html>
  18. Hoppe, C. C., Nguyen, L. T., Kirsch, L. E., Wiencek, J. M. (2008). Characterization of seed nuclei in glucagon aggregation using light scattering methods and field-flow fractionation. *Journal of Biological Engineering*, 2(10).
  19. Kirsch, L. E. (2007). Package Integrity Testing. *CRC Press*.
  20. Muangsiri, W., Kirsch, L. E. (2006). The Protein-binding and Drug Release Properties of Macromolecular Conjugates containing Daptomycin and Dextran. *International Journal of Pharmaceutics*, 315, 30-43.
  21. Naik, H., Murry, D. J., Kirsch, L. E., Fleckenstein, L. (2005). Development and validation of a high-performance liquid chromatography-mass spectroscopy assay for determination of artesunate and its metabolite dihydroartemisinin in human plasma. *Journal of Chromatography B*, 816(1-2), 233-242.

22. Kirsch, L. E. (2005). Extemporaneous Quality. *PDA Journal of Pharmaceutical Science and Technology*, 59(1 & 3).
23. Joshi, A., Kearney, W., Sawai, M., Kirsch, L. E. (2005). Studies on the Mechanism of Aspartic Acid Cleavage and Deamidation in the Acidic Degradation of Glucagon. *Journal of Pharmaceutical Sciences*, 94(9), 1912-1927.
24. Muangsiri, W., Kearney, W. R., Teesch, L. M., Kirsch, L. E. (2005). Studies on the Reactions between Daptomycin and Glyceraldehyde. *International Journal of Pharmaceutics*, 289(1-2), 133-150.
25. Zhang, X., Kirsch, L. E. (2004). Correlation of the Thermal Stability of Phospholipid-based Emulsions and Microviscosity Measurements as Determined by Fluorescence Polarization. *Pharmaceutical Development and Technology*, 9(2), 219-227.
26. Kirsch, L. E. (2004). Lessons unlearned. *PDA Journal of Pharmaceutical Science and Technology*, 58(3), 119-120.
27. Kirsch, L. E. (2004). PDA Students. *PDA Journal of Pharmaceutical Science and Technology*, 58(5), 241-242.
28. Joshi, A., Kirsch, L. E. (2004). The estimation of glutaminyl deamidation and aspartyl cleavage rates in glucagon. *International Journal of Pharmaceutics*, 273(1-2), 213-219.
29. Zhang, X., Kirsch, L. E. (2003). An Assessment of Techniques for Evaluating the Physical Stability of Parenteral Emulsions. *PDA Journal of Pharmaceutical Science and Technology*, 57(4), 300-315.
30. Nguyen, L., Wiencek, J., Kirsch, L. E. (2003). Characterization Methods for the Physical Stability of Biopharmaceuticals. *PDA Journal of Pharmaceutical Science and Technology*, 57(6), 429-445.
31. Zhang, X., Kirsch, L. E. (2003). The Physical Stability of Thermally-stressed Phospholipid-based Emulsions Containing Methyl, Propyl and Heptyl Parabens as Model Drugs. *International Journal of Pharmaceutics*, 265(1-2), 133-140.
32. Kirsch, L. E. (2002). Beyond bioterrorism. *PDA Journal of Pharmaceutical Science and Technology*, 56(3), 113-114.
33. Joshi, A., Kirsch, L. E. (2002). The Relative Rates of Asparaginyl and Glutaminyl in Glucagon Fragment 22-29 under Acidic Conditions. *Journal of Pharmaceutical Science*, 91(11), 2332-2342.
34. Kirsch, L. E., Zhang, X., Muangsiri, W., Redmon, M., Luner, P., Tartrate, D. (2001). Development of a Lyophilized Formulation for (R,R)-Formoterol (L)-Tartrate. *Drug Development and Industrial Pharmacy*, 27(1), 89-96.
35. Kirsch, L. E. (2001). Power to the People. *PDA Journal of Pharmaceutical Science and Technology*, 55(5), 261-262.
36. Luner, P., Kirsch, L. E., Majuru, S., Oh, E., Joshi, A., Wurster, D., Redmon, M. (2001). Preformulation Studies on the S-isomer of Oxybutynin Hydrochloride, an Improved Chemical Entity (ICE). *Drug Development and Industrial Pharmacy*, 27(4), 321-329.
37. Kirsch, L. E. (2001). Research Misconduct. *PDA Journal of Pharmaceutical Science and Technology*, 55(4), 205-206.
38. Muangsiri, W., Kirsch, L. E. (2001). The Kinetics of Daptomycin Degradation in Alkaline Solutions. *Journal of Pharmaceutical Science*, 90(8), 1066-1075.
39. Kirsch, L. E. (2000). Peer Review Fallibility. *PDA Journal of Pharmaceutical Science and Technology*, 54(4), 279.
40. Kirsch, L. E. (2000). Pharmaceutical Container/Closure Integrity VI: Correlations Between Liquid Tracer Methods and Microbial Ingress. *PDA Journal of Pharmaceutical Science and Technology*, 54(4), 305.

41. Joshi, A., Kirsch, L. E. (2000). The Acidic Degradation Pathways of Glucagon. *International Journal of Pharmaceutics*, 203(1-2), 115.
42. Kirsch, L. E. (2000). The Ivied Halls of Industry. *PDA Journal of Pharmaceutical Science and Technology*, 54(6), 433-434.
43. Kirsch, L. E. (2000). The PDA Journal and the Validation of Science. *PDA Journal of Pharmaceutical Science and Technology*, 54(3), 171.
44. Kirsch, L. E. (2000). The Rule of Three. *PDA Journal of Pharmaceutical Science and Technology*, 54(5), 365.
45. Nguyen, L., Muangsiri, W., Kirsch, L. E., Schiere, R., Morton Guazzo, D. (1999). Pharmaceutical Container/Closure Integrity IV: Development of an Indirect Correlation Between Microbial Ingress and Vacuum Decay Leakage Detection. *PDA Journal of Pharmaceutical Science and Technology*, 54(4), 211.
46. Kirsch, L. E., Nguyen, L., Kirsch, A. M., Schmitt, G., Koch, M., Wertli, T., Lehmann, M., Schramm, G. (1999). Pharmaceutical Container/Closure Integrity V: Comparison of Helium Leak Rate and LFC Methods. *PDA Journal of Pharmaceutical Science and Technology*, 53(5), 235.
47. Carroll, M. C., Denny, V. F., Guazzo, D. M., Kaiser, M. W., Kirsch, L. E., Ludwig, J. D., Masover, G. K., May, J. L., Moldenhauer, J. E., Olsen, J. I., Polson, T. M., Wright, G. E. (1998). Technical Report No. 27: Pharmaceutical Package Integrity. *PDA Journal of Pharmaceutical Science and Technology*, 52(S2).
48. Kirsch, L. E., Nguyen, L., Moeckly, C. S. (1997). Pharmaceutical Container/Closure Integrity I: Mass Spectrometry-based Helium Leak Rate Detection for Rubber-stoppered Glass Vials. *PDA Journal of Pharmaceutical Science and Technology*, 51(5), 187.
49. Kirsch, L. E., Nguyen, L., Gerth, R. (1997). Pharmaceutical Container/Closure Integrity II: The Relationship Between Microbial Ingress and Helium Leak Rates in Rubber-stoppered Glass Vials. *PDA Journal of Pharmaceutical Science and Technology*, 51(5), 203.
50. Kirsch, L. E., Nguyen, L., Moeckly, C. S., Gerth, R. (1997). Pharmaceutical Container/Closure Integrity III: The Relationship Between Microbial Ingress and Helium Leak Rates in Rubber-stoppered Glass Vials. *PDA Journal of Pharmaceutical Science and Technology*, 51(5), 195.
51. Sihn, Y.-S., Guillory, J., Kirsch, L. E. (1997). Quantitation of Taurolidine Decomposition in Polymer Solutions by Chromotropic Acid Formaldehyde Assay Method. *Journal of Pharmaceutical and Biomedical Analysis*, 16(4), 643.
52. Kirsch, L. E., Sihn, Y.-S. (1997). The Effect of Polyvinylpyrrolidone on the Stability of Taurolidine. *Pharmaceutical Development and Technology*, 2(4), 345.
53. Kirsch, L. E., Nguyen, L., Moeckly, C. S., Gerth, R. (1996). The Application of Mass Spectrometry Leak Testing to Pharmaceutical Container/Closure Integrity. *Proceedings of the PDA International Congress*.
54. Kirsch, L. E., Riggan, R., Gearhart, D., LeFeber, D., Lytle, D. (1993). In-process Protein Degradation by Exposure to Trace Amounts of Sanitizing Agents. *Journal of Parenteral Science and Technology*, 47, 155.
55. Kirsch, L. E., Redmon, M. P. (1993). Quality Tools for Pharmaceutical Product Development. *Proceedings of the Biopharmaceutical Section of the American Statistical Association*.
56. Inman, E. L., Kirsch, L. E. (1990). Stabilized parenteral formulation of daptomycin. *Eur. Pat.*.
57. Kirsch, L. E., Molloy, R., DeBono, M., Baker, P., Farid, K. (1989). Kinetics of the Aspartyl

- Transpeptidation of Daptomycin, a Novel Lipopeptide Antibiotic. *Pharmaceutical Research*, 6, 387.
58. Kirsch, L. E., Notari, R. (1984). Aqueous Conversion Kinetics and Mechanisms of Ancitabine, Prodrug of the Antileukemic Agent Cytarabine. *Journal of Pharmaceutical Sciences*, 73, 897.
  59. Kirsch, L. E., Notari, E. (1984). Pharmacokinetic Prodrug Modeling: In Vitro and In Vivo Kinetics and Mechanisms of Ancitabine Bioconversion to Cytarabine. *Journal of Pharmaceutical Sciences*, 73, 728.
  60. Kirsch, L. E., Notari, R. (1984). Theoretical Basis for the Detection of General-Base Catalysis in the Presence of Predominating Hydroxide Catalysis. *Journal of Pharmaceutical Sciences*, 73, 724.
  61. Larson, R., Kirsch, L. E., Shaw, S., Christian, J., Born, G. (1972). Excretion and Tissue Distribution of Uniformly Labeled 14C-Pentachlorophenol in Rats. *Journal of Pharmaceutical Sciences*, 61, 2004.

### **Presentations**

1. Lee Kirsch, "Physiologically-based Pharmacokinetic Models and Tools for Drug Development and Therapeutics", February 21, 2014, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia.
2. Lee Kirsch, "Linking Stability to Manufacturing in the Quality-By-Design Pharmaceutical Development Paradigm", February 20, 2014, The University of Nottingham-Malaysia, Malaysia.
3. Lee E. Kirsch, "Trends in Pharmaceutical Sciences: Education and Research", February 28, 2014, University of Philippines-Manila, Philippines.
4. Lee E. Kirsch, "Drug Degradant Risk Assessment using PBPK Modeling", March 4, 2014, Mahidol University, Thailand.
5. Lee E. Kirsch, "Get Reader→Get Set→Publish: the why, what and how of science writing", March 11, 2014, Mahidol University, Thailand.
6. Lee E. Kirsch, "Modernized Pharmaceutical Stability Evaluation and Packaging Science". March 26, 2014, University of Surabaya, Indonesia.
7. Lee E. Kirsch, "On the Role of Physical Stability in the Chemical Instability of Pharmaceuticals". March 28, 2014, Institut Teknologi Bandung, Indonesia.
8. Lee E. Kirsch, "Kinetics and Mechanisms of Gabapentin Instability", March 29, 2014, Universitas Gadjah Mada, Yogyakarta, Indonesia.
9. Lee E. Kirsch, "Trends in Pharmaceutical Technology Education", April 8, 2014, University of Health Sciences, Vientiane, Lao PDR.
10. Lee E. Kirsch, "Trends in Pharmaceutical Sciences, Manufacturing and Regulatory", Hanoi University of Pharmacy, April 5, 2014, Vietnam.
11. Lee E. Kirsch, "Physiologically-based Pharmacokinetic Models and Tools for Drug Development and Therapeutics Applications". SINATER 2013, Federal University of Pernambuco, Recife, Brazil, 2013.
12. Mo'tasem M. Alsmadi, Stephen D. Stamatis, Lawrence Fleckenstein, and Lee E. Kirsch, "Whole Body Physiologically Based Pharmacokinetic (WBPBPK) Model of Ivermectin (IVM)" 2013, AAPS Annual Meeting and Exposition. San Antonio, TX.
13. Nguyen HQ, Stamatis SD, Kirsch LE., "Risk assessment of drug degradants using a physiologically-based pharmacokinetic model approach". 2013, AAPS Annual Meeting and Exposition. San Antonio, TX.



14. Radaduen Tinmanee, Stephen D. Stamatis, Lee E. Kirsch, "Modeling Chemical and Physical Instability Pathways of Gabapentin/Excipient Mixtures", 2013, *AAPS Annual Meeting and Exposition*. San Antonio, TX.
15. Nguyen HQ, Stamatis SD, Kirsch LE "Physiologically based risk assessment for drug product degradants with a case study for aniline in rat".. 2012. *Health Sciences Research Week*. University of Iowa. Carver College of Medicine.
16. Radaduen Tinmanee, Stephen D. Stamatis, Lee E. Kirsch, Sarah C. Larsen, Kenneth R. Morris. "The Effect of Excipients on API Stability: Covalent and Polymorphic Transitions." Poster session presented at: 2012 AAPS Annual Meeting and Exposition; 2012 October 14-18; Chicago, IL.
17. Stamatis SD, McLennan MJ, and Kirsch LE, "Architecture of pHUBpk: A portal to active learning environments for understanding rational linkages between drug and patient characteristics and pharmacokinetics", AAPS, Chicago IL, 2012
18. Stamatis SD, McLennan MJ, and Kirsch LE, "Active learning environments for understanding drug distribution, elimination and bioequivalence in pHUBpk on the pharmaHUB", AAPS, Chicago IL, 2012
19. Nguyen H, Stamatis SD, and Kirsch LE, "Risk Assessment of drug degradants using a physiologically-based Pharmacokinetic Model Approach", AAPS Chicago IL, 2012
20. Stamatis SD, McLennan MJ, and Kirsch LE, "Kpred and Vdss: Free Tools on the PharmaHUB for Exploring Drug Tissue Partitioning and Distribution", Podium presentation, AIChE National Meeting, Pittsburgh, PA, 2012
21. Tinmanee, R., Stamatis, S., Huang, H., Ngeacharernkul, P., Kirsch, L. E., AAPS Annual Meeting, "Development of a shelf life prediction model using Bayesian parameter estimation for kinetics of solid state gabapentin degradation", Washington DC, USA, Contributed. (2011).
22. Tinmanee, R., Stamatis, S., Dempah, E., Munson, E., Kirsch, L. E., AAPS Annual Meeting, "Modeling polymorphic transformations of gabapentin and assessing the effect of excipients using PXRD and ssNMR", Washington DC, USA, Contributed. (2011).
23. Chanvorachote, B., Qiu, J., Muangsiri, W., Nimmannit, U., Kirsch, L. E., AAPS Annual Meeting and Exposition, "The mechanism between PAMAM dendrimers and lipopeptide (daptomycin)", Washington DC, Contributed. (October 2011).
24. Tinmanee, R., Stamatis, S., Nguyen, Q., Zong, Z., Kirsch, L. E., NIPTE/FDA Research Symposium, "Formulation of a gabapentin drug degradation model that combines manufacturing and storage stress variables", Rockville, USA, Contributed. (June 2011).
25. Tinmanee, R., Zong, Z., Kirsch, L. E., NIPTE/FDA Research Symposium, "Role of excipients in the solid state lactamization of gabapentin", Rockville, USA, Contributed. (June 2011).
26. Qiu, J., Kirsch, L. E., AAPS National Biotechnology Conference, "The effects of aggregation and conformation on the ionization of lipopeptide (Daptomycin)", San Francisco, CA, Contributed. (May 2011).
27. Buckner, I., Dalal, N., Tinmanee, R., Zong, Z., Huang, H., Qiu, J., Kirsch, L. E., AAPS, "Excipient effects on the solid-state stability of gabapentin", New Orleans, Louisiana, USA, Contributed. (November 2010).
28. Qiu, J., Yu, L., Kirsch, L. E., AAPS Annual Meeting and Exposition, "Determination of the complex ionization behaviour of daptomycin", New Orleans, Louisiana, Contributed. (November 2010).
29. Zong, Z., Kirsch, L. E., Kaushal, A., Suryanarayanan, R., Dempah, E., Munson, E., FIP Pharmaceutical Sciences World Congress in Association with the AAPS Annual Meeting and Exposition, "A Kinetic Model for the Solid State Degradation of Gabapentin", New

- Orleans, Louisiana, Contributed. (November 2010).
30. Kaushal, A., Dempah, E., Huang, H. G., Qiu, J., Munson, E., Kirsch, L. E., Suryanarayanan, R., FIP Pharmaceutical Sciences World Congress in Association with the AAPS Annual Meeting and Exposition, "Phase transformations in gabapentin during wet granulation and drying", New Orleans, Louisiana, Contributed. (November 2010).
  31. Dempah, K., Kaushal, A., Huang, H. G., Suryanarayanan, R., Kirsch, L. E., Munson, E., FIP Pharmaceutical Sciences World Congress in Association with the AAPS Annual Meeting and Exposition, "Predicting Gabapentin Stability upon Processing using SSNMR", New Orleans, Louisiana, Contributed. (November 2010).
  32. Kirsch, L. E., Department of Chemical and Biological Engineering, Illinois Institute of Technology, "On the Role of Physical Stability on the Chemical Instability of Pharmaceuticals", Chicago, IL, Invited. (October 21, 2010).
  33. Kirsch, L. E., Primera Reunion Internacional De Ciencias Farmaceuticas (RICiFa 2010), "A Case Study on Linking Solid-state Stability to Manufacturing Design in the FDA's Quality-by-Design Pharmaceutical Development Paradigm", Cordoba, Argentina, Invited. (June 25, 2010).
  34. Kaushal, A., Suryanarayanan, R., Zong, Z., Desai, S., Huang, H.-S., Khan, M., Kirsch, L. E., Barich, D. H., Munson, E. J., AAPS Annual Meeting, "Anhydrous and monohydrate gabapentin inter-conversion: Potential implications during solid dosage form manufacture", Los Angeles, Contributed. (2009).
  35. Barich, D. H., Munson, E. J., Kaushal, A., Suryanarayanan, R., Zong, Z., Desai, S., Huang, H.-S., Khan, M., Kirsch, L. E., AAPS Annual Meeting, "Characterization of Gabapentin Forms and Stability using Solid-State NMR Spectroscopy", Los Angeles, Contributed. (2009).
  36. Zong, Z., Desai, S., Kaushal, A., Barich, D., Huang, H., Munson, E., Suryanarayanan, R., Khan, M., Kirsch, L. E., AAPS Annual Meeting, "The Stabilizing Effect of Moisture on the Solid-State Degradation of Gabapentin", Los Angeles, Contributed. (2009).
  37. Zong, Z., Desai, S., Huang, H.-S., Kirsch, L. E., Kaushal, A., Suryanarayanan, R., Barich, D. H., Munson, E. J., Wildfong, P., Buckner, I., Drennen, J., Pingali, K. C., Muzzio, F. J., Kayrak-Talay, D., Litster, J. D., Reklaitis, G., Bogner, R., Khan, M., AIChE Annual Meeting, "The Development of Methods to Link Design Space Models to Product Stability", Nashville, Contributed. (2009).
  38. Kirsch, L. E., Symposium presentation at the University of Wisconsin, "Pharmaceutical Chemistry of a Lipopeptide Antibiotic (Daptomycin)", Invited. (March 27, 2009).
  39. Qiu, J., Kirsch, L. E., AAPS Annual meeting, "The effects of aggregation on the pharmaceutical chemistry of daptomycin", Atlanta, Contributed. (November 2008).
  40. Kirsch, L. E., NIPTE Stakeholders Meeting, "An Introduction to the NIPTE Curriculum", Chicago, Contributed. (April 2008).
  41. Kirsch, L. E., Annual AAPS meeting, "Transforming Pharmaceutical Technology Education", San Diego, Invited. (2007).
  42. Qiu, J., Kirsch, L. E., AAPS Annual Meeting, "Evaluation of Lipopeptide Aggregation Using Light Scattering, Fluorescence and NMR Spectroscopy", San Diego, Contributed. (November 2007).
  43. Desai, S., Kirsch, L. E., AAPS Annual Meeting, "Ortho Substitution Effects in the Hydrolysis of Formanilides", San Diego, Contributed. (November 2007).
  44. Naik, H., Kirsch, L. E., Fleckenstein, L., AAPS Annual Meeting, "Population pharmacokinetics of artesunate and its metabolite, dihydroartemisinin", San Diego, Contributed. (November 2007).

45. Chanvorachote, B., Kirsch, L. E., AAPS Annual Meeting, "Studies on the Binding between Daptomycin and PAMAM Dendrimers", San Diego, Contributed. (November 2007).
46. Zong, Z., Kirsch, L. E., AAPS Annual Meeting, "Studies on the Instability of Chlorhexidine", San Diego, Contributed. (November 2007).
47. Kirsch, L. E., AAPS Annual Meeting, "Transforming Pharmaceutical Technology Education: A NIPTE Proposal", Contributed. (November 2007).
48. Kirsch, L. E., Annual PDA Meeting, "NIPTE Roadmap", Las Vegas. (March 2007).
49. Kirsch, L. E., Science and Education Advisory Committee meeting, "NIPTE Roadmap", Chicago, Contributed. (March 2007).
50. Kirsch, L. E., Chemical and Biochemical Engineering Symposium Series, "Physical and Pharmaceutical Chemistry of Daptomycin", The University of Iowa, Invited. (February 15, 2007).
51. Zong, Z., Kirsch, L. E., AAPS meeting, "Kinetic Studies of the Formation of p-Chloroaniline from the Degradation of Chlorhexidine", Nashville, Contributed. (November 2005).
52. Gokhale, M., Kirsch, L. E., AAPS meeting, "Kinetics and Mechanisms of the Glycosylation of Weakly Basic Aromatic Amines and Monosaccharides", Nashville, Contributed. (November 2005).
53. Desai, S., Kirsch, L. E., AAPS meeting, "Preliminary Studies of Ortho Substitution Effects on Amide Hydrolysis using Formanilides as Model Compounds", Nashville, Contributed. (November 2005).
54. Kirsch, L. E., Pharmaceutical Forum, "Depot Injection Systems: Current Uses and Issues", London, England, Invited. (November 2005).
55. Kirsch, L. E., North Carolina Discussion Group, Research Triangle Part, "Adventures in Peptide Degradation Kinetics", Durham, NC, Invited. (June 6, 2005).
56. Gokhale, M., Kirsch, L. E., AAPS Annual Meeting, "The Effects of pH and Buffers on the Kinetics of Kynurenine Glycosylation", Baltimore, MD, Contributed. (November 2004).
57. Kirsch, L. E., Pharmaceutical Microbiology Forum, "Package Integrity Quality Assurance", Fairport, NY, Invited. (October 2004).
58. Gokhale, M., Kirsch, L. E., AAPS Annual Meeting, "Preliminary Kinetic Studies on the Reaction of Kynurenine with D-glucose", Stalt Lake City, Contributed. (October 2003).
59. Kirsch, L. E., University of North Carolina, College of Pharmacy, "Chemical Degradation of Pharmaceutical Peptide", Invited. (April 15, 2003).
60. Kirsch, L. E., Genentech, "The Science Behind Pharmaceutical Packaging Quality Assurance", South San Francisco, CA, Invited. (February 2003).
61. Muangsiri, W., Kirsch, L. E., Annual Meeting of the American Association of Pharmaceutical Scientists, "In Vitro Characterization of Macromolecular Antibiotic Prodrugs", Toronto, Canada, Contributed. (November 2002).
62. Muangsiri, W., Kirsch, L. E., Annual Meeting of the American Association of Pharmaceutical Scientists, "Preparation of Macromolecular Antibiotic Prodrugs", Toronto, Canada, Contributed. (November 2002).
63. Kirsch, L. E., Annual Meeting of the American Association of Pharmaceutical Scientists, "Techniques for Establishing Critical Leakage Specifications", Toronto, Canada, Contributed. (November 13, 2002).
64. Kalvakota, B., Kirsch, L. E., Redmon, M., Thakur, A., Annual Meeting of the American Association of Pharmaceutical Scientists, "The Degradation of (R,R)-formoterol-L-tartrate in Aqueous Solutions", Denver, Colorado, Contributed. (October 2001).
65. Joshi, A., Kirsch, L. E., Annual Meeting of the American Association of Pharmaceutical

- Scientists, "The Relative Rates of Asparaginy and Glutaminyl Deamidation in Glucagon Fragment 22-29 under Acidic Conditions", Denver, Colorado, Contributed. (October 2001).
66. Kirsch, L. E., Pulmonary Delivery and Disposition of Inhaled Aerosols Workshop, Controlled Release Society 28th International Symposium, "Protein and Peptide Stability in the Liquid and Solid States", San Diego, California, Contributed. (June 24, 2001).
  67. Joshi, A., Kirsch, L. E., Annual Meeting of the Pharmaceutical Congress of the Americas, "Determination of Relative Cleavage and Deamidation Rates in Acidic Glucagon Solutions to Evaluate Sequence Effects", Orlando, Florida, Contributed. (March 2001).
  68. Kirsch, L. E., Pharmacia, "Package Integrity Testing for Sterility Assurance", Portage, MI, Invited. (October 2000).
  69. Kirsch, L. E., Cubist Pharmaceutical, "The Role of Aggregation in the Kinetics of Daptomycin Degradation", Cambridge, MA, Invited. (August 2000).
  70. Joshi, A. B., Kirsch, L. E., 1999 Annual American Association of Pharmaceutical Scientists Meeting, "Acidic Degradation Pathways of Glucagon", New Orleans, Contributed. (November 1999).
  71. Muangsiri, W., Kirsch, L. E., 1999 Annual American Association of Pharmaceutical Scientists Meeting, "Aqueous Degradation of Daptomycin in Alkaline Solutions", New Orleans, Contributed. (November 1999).
  72. Nguyen, L., Kirsch, L. E., Wiencek, J., 1999 Annual American Association of Pharmaceutical Scientists Meeting, "Effects of Shear Stress on the Structural and Mechanical Characteristics of Glucagon Gel Systems", New Orleans, Contributed. (November 1999).
  73. Zhang, X., Kirsch, L. E., 1999 Annual American Association of Pharmaceutical Scientists Meeting, "Microviscosity of the Emulsion Determined by Fluorescence Polarization", New Orleans, Contributed. (November 1999).
  74. Kirsch, L. E., Zhang, Z., Muangsiri, W., Luner, P., Wurster, D., Redmon, M., 1999 Annual American Association of Pharmaceutical Scientists Meeting, "RR-Formterol (L) Tartrate Development", New Orleans, Contributed. (November 1999).
  75. Kirsch, L. E., Majuru, S., Oh, E., Joshi, A., Luner, P., Wurster, D., Redmon, M., 1999 Annual American Association of Pharmaceutical Scientists Meeting, "S-Oxybutynin Preformulation Studies", New Orleans, Contributed. (November 1999).
  76. Zhang, X., Kirsch, L. E., 1999 Annual American Association of Pharmaceutical Scientists Meeting, "Study of the Mechanism of Thermally-stressed Parenteral Fat Emulsion", New Orleans, Contributed. (November 1999).
  77. Kirsch, L. E., PDA and American Association of Pharmaceutical Scientists Chicagoland discussion groups, "Debunking Pharmaceutical Package Integrity Testing", Chicago, Invited. (September 1999).
  78. Zhang, X., Kirsch, L. E., 1997 Annual American Association of Pharmaceutical Scientists Meeting, "Drug Effects on the Coalescence Rate of Thermally-stressed Emulsions", San Francisco, Contributed. (November 1998).
  79. Nguyen, L. T., Kirsch, L. E., 1998 Annual American Association of Pharmaceutical Scientists Meeting, "Establishing the Microbial Barrier Properties of Pharmaceutical Packaging by Physical Leak Rate Measurements", San Francisco, Contributed. (November 1998).
  80. Kirsch, L. E., Israel Chapter of the PDA, "Pharmaceutical Package Integrity", Herzelia, Israel, Invited. (October 28, 1998).
  81. Kirsch, L. E., Medical College of Virginia, "Pharmaceutical Instability of Peptides", Invited.

- (September 1998).
82. Kirsch, L. E., Morton Guazzo, D., PDA Training and Research Center, "Leakage and Parenteral Packaging Seal Integrity", Baltimore, MD, Invited. (July 1998).
  83. Kirsch, L. E., the International Blow-Fill-Seal Operators Meeting, "Current and Future State of Pharmaceutical Package Integrity", Cambridge, MA, Invited. (April 30, 1998).
  84. Kirsch, L. E., Nguyen, L. T., Morton Guazzo, D., Scheire, R., Muangsiri, W., Western PDA meeting, "Methods for the Development of Indirect Correlations between Physical Leak Rate Methods and Microbial Ingress into Parenteral Packaging", San Francisco, Contributed. (March 1998).
  85. Kirsch, L. E., ESI-Lederle, "Current Issues in Pharmaceutical Container/Closure Integrity Technologies", Invited. (February 2, 1998).
  86. Nguyen, L. T., Gerth, R., Kirsch, L. E., 1997 Annual American Association of Pharmaceutical Scientists Meeting, "A Model for Predicting Helium Leak Rates of Defective Sealed Vials and Its Application in the Validation of Helium Leak Rate Method for Pharmaceutical Container/Closure Systems", Boston, Contributed. (November 1997).
  87. Zhang, X., Kirsch, L. E., 1997 Annual American Association of Pharmaceutical Scientists Meeting, "An Assessment of Techniques for Evaluating the Physical Stability of Parenteral Microemulsions", Boston, Contributed. (November 1997).
  88. Nguyen, L. T., Gerth, R., Moeckly, C. S., Kirsch, L. E., 1997 Annual American Association of Pharmaceutical Scientists Meeting, "Correlation of Mass Spectrometry-based Helium Leak Measurements to Microbial Ingress for Pharmaceutical Container/Closure Integrity Testing", Boston, Contributed. (November 1997).
  89. Kirsch, L. E., Executive MBA program offered by the College of Business Administration at The University of Iowa, "A Technologist's View of the Pharmaceutical Industry", Invited. (August 1997).
  90. Kirsch, L. E., Glaxo Welcome, "Pharmaceutical Container/Closure Integrity Technologies", Invited. (April 14, 1997).
  91. Kirsch, L. E., PDA International Congress, "PDA Container/Closure Study", Osaka, Japan, Invited. (February 18, 1997).
  92. Nguyen, L., Moeckly, C., Kirsch, L. E., 1996 Annual American Association of Pharmaceutical Scientists Meeting, "Pharmaceutical Container Closure Integrity by Mass Spectrometry-based Leak Detection", Seattle, Contributed. (1996).
  93. Kirsch, L. E., 50th Annual PDA meeting, "Application of Mass Spectrometry Leak Testing to Pharmaceutical Package Integrity Quality Assurance", Philadelphia, Invited. (November 20, 1996).
  94. Kirsch, L. E., Seminar at Fujisawa USA, "Pharmaceutical Container/Closure Integrity Technologies", Chicago, Invited. (April 19, 1996).
  95. Sihn, Y., Guillory, K., Kirsch, L. E., 1995 Annual American Association of Pharmaceutical Scientists meeting, "Degradation Kinetics and Interaction Studies of Taurolidine Equilibrium Products with PVP in Aqueous Media", Contributed. (1995).
  96. Kirsch, L. E., 1995 Annual American Association of Pharmaceutical Scientists Meeting, "Challenges in the Sterilization of Injectable Disperse Systems", Miami, Invited. (November 1995).
  97. Kirsch, L. E., Genetics Institute, "Re-engineering Pharmaceutical Product Development", Andover, Invited. (December 1994).
  98. Kirsch, L. E., Redmon, M. P., 16th Annual Midwest Biopharmaceutical Statistics Workshop, "Quality Tools Applied to Pharmaceutical Product Development: Quality Function Deployment, Business Function Deployment, and Failure Modes and Effects

- Analysis", Invited. (May 1993).
99. Kirsch, L. E., Redmon, M. P., Arden House Conference, "Biopharmaceutical Product Development", Invited. (February 1993).
  100. Kirsch, L. E., Annual American Association of Pharmaceutical Scientists Meeting, "New Method for Predicting Arrhenius Behavior in Accelerated Drug Degradation Studies", Washington DC, Contributed. (October 1991).
  101. Kirsch, L. E., Virginia Commonwealth University, School of Pharmacy faculty and graduate students, "Degradation Kinetics Short Course and Simulation Laboratory", Invited. (April 1991).
  102. Stout, P., Khoury, N., Mauger, J., Kirsch, L. E., Annual American Association of Pharmaceutical Scientists Meeting, "Human Zinc Insulin Suspension Release Kinetics", Las Vegas, Nevada, Contributed. (November 1990).
  103. Kirsch, L. E., Land O Lakes meeting, "Protein Reactivity", Invited. (June 1990).
  104. Kirsch, L. E., Lefeber, D., Riggin, R., Gearhart, D., Clone to Clinic Biotechnology Meeting, "The Susceptibility of Human Growth Hormone to In-process Degradation", Amsterdam, the Netherlands, Contributed. (March 1990).
  105. Kirsch, L. E., University of Nebraska, College of Pharmacy, Pharmaceutical Sciences Research Retreat, "Strategies for Research Collaboration with Industrial Sites", Boystown, Nebraska, Invited. (November 1989).
  106. Mauger, K., Shaeiwitz, J., Mauger, J., Kirsch, L. E., Annual American Association of Pharmaceutical Scientists meeting, "Mechanism of Crystalline Zinc Insulin Dissolution", Atlanta, Georgia, Contributed. (October 1989).
  107. Kirsch, L. E., Annual American Association of Pharmaceutical Scientists meeting, "Protein Degradation Pathways in Parenteral Dosage Forms", Atlanta, Georgia, Invited. (October 1989).
  108. Gearhart, D., Lefeber, D., Riggin, R., Kirsch, L. E., Annual American Association of Pharmaceutical Scientists meeting, "The Effects of Parenteral Sterilants on the Generation of Protein Degradation Products During Pharmaceutical Processing", Atlanta, Georgia, Contributed. (October 1989).
  109. Khoury, N., Stout, P., Mauger, J., Shaeiwitz, J., Kirsch, L. E., ACS Colloid and Surface Science Symposium, "Dissolution of Recombinant Human Insulin Crystal", Seattle, Washington, Contributed. (June 1989).
  110. Kirsch, L. E., Rho Chi lecturer, "Biotechnic Drug Development", Duquesne University, Invited. (December 1988).
  111. Stout, P., Mauger, J., Koury, N., Kirsch, L. E., American Association of Pharmaceutical Scientists meeting, "Dissolution Characteristics of Changing Mixtures of Amorphous: Crystalline Humulin Zinc Insulin", Orlando, Florida, Contributed. (November 1988).
  112. Gearhart, D., Kirsch, L. E., Annual American Association of Pharmaceutical Scientists meeting, "Dry-state Deamidation of Glucagon", Orlando, Florida, Contributed. (November 1988).
  113. Kirsch, L. E., Short course presented to the West Virginia University, School of Pharmacy graduate students, "Degradation Kinetics Short Course and Simulation Laboratory", Invited. (May 1988).
  114. Kirsch, L. E., West Virginia University, University of Kentucky, Duquesne University, Medical College of Virginia, Biochemical Development Seminar Series, "The Role of Transpeptidation and Deamidation in the Pharmaceutical Instability of Proteins and Peptides", Invited. (1987).
  115. Kirsch, L. E., Biotechnology symposium at the American Association of Pharmaceutical

- Scientists meeting, "The Role of Transpeptidation and Deamidation in the Pharmaceutical Instability of Proteins and Peptides", Boston, Invited. (June 1987).
116. Kirsch, L. E., Short Course presented to the West Virginia University, School of Pharmacy graduate students, "Degradation Kinetics Short Course and Simulation Laboratory", Invited. (May 1987).
  117. Kirsch, L. E., Bucko, J., Smith, W., Akers, M., Hargrove, W., 1986 American Association of Pharmaceutical Scientists meeting, "Development of a Quantitative Model for the In Vitro and In Vivo Delivery Kinetics of CRIS, a Novel Intravenous System", Washington DC, Contributed. (November 1986).
  118. Stout, P., Mauger, J., Kirsch, L. E., Khoury, N., Sheliga, T., Annual American Association of Pharmaceutical Scientists, "Dissolution of Lente Insulins", Washington DC, Contributed. (November 1986).
  119. Kirsch, L. E., Humana Corporate Center, "IVAC CRIS System Performance", Louisville, Kentucky, Invited. (May 1986).
  120. Kirsch, L. E., Delaware Valley Society of Hospital Pharmacists, "Drug Delivery with the IVAC CRIS System", Philadelphia, Pennsylvania, Invited. (April 1986).
  121. Kirsch, L. E., Graduate Faculty Seminar, "Kinetics and Pharmacokinetics of Intravenous Drug Delivery", School of Pharmacy West Virginia, Invited. (January 1986).
  122. Kirsch, L. E., American Society of Hospital Pharmacists 20th Midyear Clinical Meeting, "Drug Delivery with the IVAC CRIS System", New Orleans, Louisiana, Contributed. (December 1985).
  123. Kirsch, L. E., Smith, W., Massey, E., Bechtel, L., Davies, D., Thirty-seventh National Meeting of the Academy of Pharmaceutical Sciences, "The Evaluation of Human Insulin Formulations by Kinetic Analysis of Time-Action Profiles in Rabbits", Philadelphia, Pennsylvania, Contributed. (October 1984).
  124. Kirsch, L. E., Notari, R., 130th American Pharmaceutical Association Annual Meeting, "Kinetics and Mechanism of In Vitro Prodrug Conversion to Cytarabine (ARA-C)", New Orleans, Louisiana, Contributed. (April 1983).
  125. Kirsch, L. E., Notari, R., 130th American Pharmaceutical Association Annual Meeting, "Pharmacokinetics of Prodrug Bioconversion to Cytarabine (ARC-C)", New Orleans, Louisiana, Contributed. (April 1983).

## **Grantsmanship**

**Over 55 research grants and contracts**

## **PROFESSIONAL, GOVERNMENTAL, UNIVERSITY AND OTHER SERVICE**

### **Professional/Clinical Services and Committees**

#### **Internal Committee**

University of Iowa STEM Advisory Council. (2011 - 2013).  
 College of Pharmacy Curriculum Re-engineering Task Force, "Transformers". (2009 - 2014).  
 Faculty Senate. (2008 - 2011).  
 College of Pharmacy IT Committee Chairman. (2008 - 2009).  
 Graduate College Council. (2006 - 2009).  
 College of Pharmacy Admissions Committee. (2007 - 2008).

College of Pharmacy Curriculum Committee. (2006 - 2007).  
College of Pharmacy Continuing Education Oversight Committee. (2003 - 2006).  
College of Pharmacy Industrial Consortium. (2003 - 2006).  
College of Pharmacy Admissions Committee Chairman. (2001 - 2003).  
College of Pharmacy Research Equipment Committee. (1999 - 2003).  
Pharmaceutics Search Committee Chairman. (2001 - 2002).  
Ad Hoc Planning Committee for the 1999 Collegiate Research Retreat. (1999).  
Advisory Committee to the Vice President for Research for Medical and Biological Sciences.  
(1998 - 1999).

## **General**

Member of the American Association of Pharmaceutical Scientists (1993 – present)  
Member of USP <1207> Expert Panel. (January 2011 - 2013).  
Editor-in-chief, AAPS Pharmaceutical Science and Technology Journal. (July 2008 – December, 2014).  
Faculty Committee Leadership in the National Institute for Pharmaceutical Technology and Education, Faculty Committee, Chairman and Leadership Team (2009-2011): Education Roadmap, Co Chairman: Pharmaceutical Material Section of Technology Roadmap. (2005 - 2008). Chaired the education committee for NIPTE working on the design of a national curriculum in pharmaceutical technology. (2005 – 2008)  
Editorial Advisory Board, Drug Development and Industrial Pharmacy. (June 2000 - 2009).  
Member of the Parenteral Drug Association Executive Committee. (2000 - 2002).  
Member of USP <1059> Advisory Committee of Excipient Quality. (January 2009 - January 2011).  
PQRI Working Group Member, Aseptic Processing. (2003 - 2008).  
Regulatory Affairs Advisory Board for the Parenteral Drug Association. (2003 - 2008).  
Scientific Advisory Board for the Parenteral Drug Association. (2003 - 2008).  
Strategic Planning Committee for the Parenteral Drug Association. (2003 - 2008).  
Editorial Advisory Board, Pharmaceutical Development and Technology. (1995 - 2008).  
Editor, The PDA Journal of Pharmaceutical Science and Technology. (February 2000 - June 2008).  
Reviewer for United Arab Emirate University Research Fund. (2004).  
The University of Iowa Research Review Committee in the Biological Sciences. (2003 - 2004).  
Reviewer for State of Indiana 21st Century Fund proposals. (2003).  
Member of the Ad Hoc National Institutes of Health SBIR and STTR Study Section for Drug Development and Delivery. (2000).  
Reviewer for the National Science Foundation Directorate for Engineering. (2000).  
Member of the Pharmaceutical Sciences Alliance Council, Aseptic Processing Advisory Panel, PDA-TRI Container/Closure Applied Research Task Force, and Faculty member for the Parenteral Drug Association Research and Training Center. (1998 - 1999).  
Chairman of the American Association of Pharmaceutical Scientists Sterile Products Focus Group. (1997).  
AAPS Pharmaceutical Technology Section Leadership Team. (1995 - 1997).  
Conference co-chairman (with Dr. John Clements of the Royal Pharmaceutical Society of Great Britain) for the 1996 Arden House Conferences. (1996).